

Claims

1. The method of manufacturing a multi-channel array droplet deposition apparatus which comprises providing a base sheet having a layer of piezoelectric material poled normal to said sheet, forming an array of parallel, open-topped droplet liquid channels in said base sheet layer so that the piezoelectric material provides upstanding walls separating successive channels, forming electrodes on channel facing surfaces of the walls, bonding a channel closure sheet to the walls, providing nozzles respectively communicating with the channels and providing means for connecting a source of droplet liquid to the channels, characterised by forming said channel closure sheet with an array of parallel conductive tracks spaced at intervals corresponding with the channel spacing, locating the channels in position parallel with and opposite said tracks, and sealing the closure sheet to the channel walls by forming bonds which mechanically and electrically connect each track to the electrodes on the channel facing sides of the walls of the channel opposite thereto.

2. The method claimed in Claim 1, characterised by connecting drive current circuits to the tracks prior to forming said bonds to connect each of the tracks to the electrodes on the channel facing sides of the walls of the channel opposite thereto.

a 3. The method claimed in Claim 1 ~~or Claim 2~~, characterised by forming said bonds as solder bonds.

4. The method claimed in Claim 3, characterised by depositing solder on either or both the tracks and the electrodes, locating the channels opposite the tracks and simultaneously forming the bonds to connect the tracks each to the electrodes of the channel facing surfaces of the walls of the channel opposite thereto.

5. The method claimed in Claim 4, characterised by heating at least the solder thereby to cause the solder to wet the tracks and the adjoining electrodes thereby to form a meniscus bridging the tracks and adjoining electrodes and cooling the solder to form said bonds.

a 6. The method claimed in ^{claim 1} ~~any preceding claim~~, characterised by forming said tracks on said channel closure sheet of width approaching that of the spacing of the electrodes on the channel facing walls.

a 7. The method claimed in ~~any one of Claims 2 to 5~~, characterised by providing said drive current circuits in a drive chip located on the channel closure sheet.

8. The method claimed in Claim 7, characterised by forming said drive chip by deposition thereof on said closure sheet to provide drive circuit means connected with said tracks.

9. A multi-channel array droplet deposition apparatus comprising a base sheet having a layer of piezoelectric material poled normal thereto, an array of parallel, open topped, droplet liquid channels in said base sheet layer provided by upstanding channel separating walls formed in said layer, electrodes provided on channel facing surfaces of the walls, a channel closure sheet bonded to the walls, nozzles respectively communicating with the channels and means for supplying droplet liquid to the channels, characterised in that said channel closure sheet has an array of parallel conductive tracks thereon spaced at intervals corresponding with the channel spacing and disposed parallel with and opposite the channels and bonds mechanically and electrically connect each track to the electrodes on the channel facing walls of the channel opposite thereto and seal the closure sheet to the channels.

10. Apparatus as claimed in Claim 9, characterised in that electric drive current circuits are connected respectively to the tracks.

a 11. Apparatus as claimed in Claim 9 ~~or Claim 10~~, characterised in that the tracks on the channel closure sheet are of width approaching that of the spacing between the electrodes on the channel facing walls.

a 12. Apparatus as claimed in ~~any one of Claims 9 to 11~~, characterised in that the bonds connecting the tracks to the electrodes are solder bonds.

13. Apparatus as claimed in Claim 12, characterised in that the solidus of the solder of said bonds is selected having regard to the values of the thermal expansion coefficients to limit the relative thermal strains of the channel closure sheet and said piezoelectric material.

a 14. Apparatus as claimed in Claim 12 ~~or Claim 13~~, characterised in that the solder of said bonds is an alloy of lead and/or tin and/or indium.

15. Apparatus as claimed in Claim 12 or Claim 13, characterised in that the solder of said bonds is an eutectic alloy including lead and tin.

16. Apparatus as claimed in Claim 12 or Claim 13, characterised in that the solder of said bonds is an alloy which includes silver.

a 17. Apparatus as claimed in ~~any one of Claims 9 to 16~~, characterised in that the channel closure sheet comprises a glass or ceramic having a relatively high elastic modulus compared with that of piezoelectric ceramic and an expansion coefficient matched to that of <110> silicon.

18. Apparatus as claimed in Claim 17, characterised in that the channel closure sheet is borosilicate glass.

~~19 Apparatus as claimed in Claim 18, characterised in that said closure sheet has deposited thereon a layer of crystalline silicon extending the width of the sheet in the channel array direction and having formed therein a multiplexer drive circuit having input and output terminals of which the output terminals are connected to the conductive tracks on the channel closure sheet.~~

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